CLAIMS

1. A spin valve sensor for a magnetic head, comprising:

a free layer;

an antiparallel (AP) self-pinned layer structure;

the AP self-pinned layer structure including:

a first AP pinned layer;

a second AP pinned layer;

an antiparallel coupling (APC) layer formed between the first and the second AP pinned layers;

a non-magnetic electrically conductive spacer layer in between the free layer and the AP self-pinned layer structure; and

a compressive stress modification layer formed adjacent the AP self-pinned layer structure.

2. The spin valve sensor of claim 1, wherein the compressive stress modification layer increases a magnetostriction in the AP self-pinned layer structure to increase self-pinning.

3. The spin valve sensor of claim 1, wherein the compressive stress modification layer reduces the likelihood of amplitude flip in the spin valve sensor.

4. The spin valve sensor of claim 1, wherein the compressive stress modification layer comprises ruthenium (Ru).

5. The spin valve sensor of claim 1, wherein the AP self-pinned structure is pinned by magnetostriction and compressive stress.

6. The spin valve sensor of claim 1, wherein an antiferromagnetic (AFM) pinning layer is not necessary for pinning the AP self-pinned layer structure.

7. The spin valve sensor of claim 1, further comprising:

a seed layer; and

the compressive stress modification layer formed between the seed layer and the AP self-pinned layer structure.

8. The spin valve sensor of claim 1, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a capping layer; and

a second compressive stress modification layer formed over the capping layer.

9. The spin valve sensor of claim 1, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a capping layer;

a second compressive stress modification layer formed over the capping layer; and

the second compressive stress modification layer comprising ruthenium (Ru).

10. The spin valve sensor of claim 1, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a capping layer;

a second compressive stress modification layer formed over the capping layer; and

wherein the second compressive stress modification layer reduces the likelihood of amplitude flip in the spin valve sensor.

11. The spin valve sensor of claim 1, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a capping layer; and

a second compressive stress modification layer formed under the capping layer.

12. The spin valve sensor of claim 1, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a capping layer;

a second compressive stress modification layer formed under the capping layer; and

the second compressive stress modification layer comprising ruthenium (Ru).

13. The spin valve sensor of claim 1, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a capping layer;

a second compressive stress modification layer formed under the capping layer; and

wherein the second compressive stress modification layer reduces the likelihood of amplitude flip in the spin valve sensor.

14. A disk drive, comprising:

a housing;

a magnetic disk rotatably supported in the housing;

a magnetic head;

a support mounted in the housing for supporting the magnetic head so as to be in a transducing relationship with the magnetic disk;

a spindle motor for rotating the magnetic disk;

an actuator positioning means connected to the support for moving the magnetic head to multiple positions with respect to said magnetic disk;

a processor connected to the magnetic head assembly, to the spindle motor, and to the actuator for exchanging signals with the magnetic head for controlling movement of the magnetic disk and for controlling the position of the magnetic head;

the magnetic head assembly including a read head;

the read head including a spin valve sensor comprising:

a free layer;

an antiparallel (AP) self-pinned layer structure;

the AP self-pinned layer structure including:

a first AP pinned layer;

a second AP pinned layer;

an antiparallel coupling (APC) layer formed between the first and the second AP pinned layers;

a non-magnetic electrically conductive spacer layer in between the free layer and the AP self-pinned layer structure; and

a compressive stress modification layer formed adjacent the AP self-pinned layer structure.

15. The disk drive of claim 14, wherein the compressive stress modification layer increases a magnetostriction in the AP self-pinned layer structure to increase self-pinning.

16. The disk drive of claim 14, wherein the compressive stress modification layer reduces the likelihood of amplitude flip in the spin valve sensor.

17. The disk drive of claim 14, wherein the compressive stress modification layer comprises ruthenium (Ru).

18. The disk drive of claim 14, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a capping layer; and

a second compressive stress modification layer formed over the capping layer.

19. The disk drive of claim 14, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a capping layer;

a second compressive stress modification layer formed over the capping layer; and

the second compressive stress modification layer comprising ruthenium (Ru).

20. The disk drive of claim 14, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a capping layer;

a second compressive stress modification layer formed over the capping layer; and

wherein the second compressive stress modification layer reduces the likelihood of amplitude flip in the spin valve sensor.

21. The disk drive of claim 14, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a capping layer; and

a second compressive stress modification layer formed under the capping layer.

22. The disk drive of claim 14, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a capping layer;

a second compressive stress modification layer formed under the capping layer; and

the second compressive stress modification layer comprising ruthenium (Ru).

23. The disk drive of claim 14, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a capping layer;

a second compressive stress modification layer formed under the capping layer; and

wherein the second compressive stress modification layer reduces the likelihood of amplitude flip in the spin valve sensor.

24. A spin valve sensor for a magnetic head, comprising:

a spin valve structure which includes:

a free layer;

an antiparallel (AP) self-pinned layer structure;

a non-magnetic electrically conductive spacer layer in between the free layer and the AP self-pinned layer structure;

the AP self-pinned layer structure including:

a first AP pinned layer;

a second AP pinned layer;

an antiparallel coupling (APC) layer formed between the first and the second AP pinned layers;

a capping layer formed over the spin valve structure; and

a compressive stress modification layer formed over the capping layer.

25. The spin valve sensor of claim 24, wherein the compressive stress modification layer reduces the likelihood of amplitude flip in the spin valve sensor.

26. The spin valve sensor of claim 24, wherein the compressive stress modification layer comprises ruthenium (Ru).

27. The spin valve sensor of claim 24, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a second compressive stress modification layer formed adjacent the AP self-pinned layer structure.

28. The spin valve sensor of claim 24, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a second compressive stress modification layer formed adjacent the AP self-pinned layer structure; and

the second compressive stress modification layer comprising ruthenium (Ru).

29. The spin valve sensor of claim 24, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a second compressive stress modification layer formed adjacent the AP self-pinned layer structure; and

wherein the second compressive stress modification layer reduces the likelihood of amplitude flip in the spin valve sensor.

30. The spin valve sensor of claim 24, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a second compressive stress modification layer formed adjacent the AP self-pinned layer structure; and

wherein the second compressive stress modification layer reduces the likelihood of amplitude flip in the spin valve sensor.

31. A disk drive, comprising:

a housing;

a magnetic disk rotatably supported in the housing;

a magnetic head;

a support mounted in the housing for supporting the magnetic head so as to be in a transducing relationship with the magnetic disk;

a spindle motor for rotating the magnetic disk;

an actuator positioning means connected to the support for moving the magnetic head to multiple positions with respect to said magnetic disk;

a processor connected to the magnetic head assembly, to the spindle motor, and to the actuator for exchanging signals with the magnetic head for controlling movement of the magnetic disk and for controlling the position of the magnetic head;

the magnetic head assembly including a read head;

the read head including a spin valve sensor comprising:

a spin valve structure which includes:

a free layer;

an antiparallel (AP) self-pinned layer structure;

a non-magnetic electrically conductive spacer layer in between the free layer and the AP self-pinned layer structure;

the AP self-pinned layer structure including:

a first AP pinned layer;

a second AP pinned layer;

an antiparallel coupling (APC) layer formed between the first and the second AP pinned layers;

a capping layer formed over the spin valve structure; and

a compressive stress modification layer formed over the capping layer.

32. The disk drive of claim 31, wherein the compressive stress modification layer reduces the likelihood of amplitude flip in the spin valve sensor.

33. The disk drive of claim 31, wherein the compressive stress modification layer comprises ruthenium (Ru).

34. The disk drive of claim 31, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a second compressive stress modification layer formed adjacent the AP self-pinned layer structure.

35. The disk drive of claim 31, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a second compressive stress modification layer formed adjacent the AP self-pinned layer structure; and

the second compressive stress modification layer comprising ruthenium (Ru).

36. The disk drive of claim 31, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a second compressive stress modification layer formed adjacent the AP self-pinned layer structure; and

wherein the second compressive stress modification layer reduces the likelihood of amplitude flip in the spin valve sensor.

37. The disk drive of claim 31, wherein the compressive stress modification layer comprises a first compressive stress modification layer and the spin valve sensor further comprises:

a second compressive stress modification layer formed adjacent the AP self-pinned layer structure; and

wherein the second compressive stress modification layer reduces the likelihood of amplitude flip in the spin valve sensor.